



**2020 Capitalization Rate Study
Telecommunications**

FINAL

Completed: April 28, 2020

MONTANA DEPARTMENT OF REVENUE

Yield Capitalization Rate Conclusion

Industry: Telecommunications

2020 Assessment Year

Capital Structure ^[1]

Equity	35.00%
Debt	65.00%

Equity Cost of Capital

		Weighting
Capital Asset Pricing Model - Ex Post ^[2]	11.55%	50%
Capital Asset Pricing Model - Ex Ante ^[2]	9.01%	40%
3 Stage Dividend Discount Model - Dividends ^[3]	9.15%	5%
3 Stage Dividend Discount Model - Earnings ^[3]	7.20%	<u>5%</u>
Weighted Average	10.19%	100%
Selected Cost of Equity	<u><u>10.20%</u></u>	

Debt Cost of Capital ^[4]

		Weighting
A - Mergent's - Avg. YTM of A Rated Corporate Bonds ^[4]	3.36%	0%
Baa - Mergent's - Avg. YTM of Baa Rated Corporate Bonds ^[4]	3.88%	0%
Ba - MTDOR - Avg. YTM of Ba Rated Corporate Bonds ^[5]	6.58%	30%
B - MTDOR - Avg. YTM of Ba Rated Corporate Bonds ^[5]	7.71%	<u>70%</u>
Weighted Average	7.37%	100%
Selected Cost of Debt	<u><u>7.40%</u></u>	

Weighted Average Cost of Capital (WACC)

Source of Capital	Capital Structure	Cost of Capital	Marginal Tax Rate	After-tax Cost of Capital	Weighted Cost
Equity	35.00%	10.20%		10.20%	3.57%
Debt	65.00%	7.40%	24.00%	5.62%	3.66%
WACC	100.00%				7.23%
WACC (Rounded)					7.30%

Notes

[1] From worksheet: Capital Structure

[2] From worksheet: Capital Asset Pricing Model Summary

[3] From worksheet: Yield Equity Summary

[4] January 2020, Mergent Bond Record

[5] Montana Department of Revenue High Yield Debt Study

MONTANA DEPARTMENT OF REVENUE

Direct Capitalization Rate Conclusion
Industry: Telecommunications
2020 Assessment Year

Capital Structure ^[1]

Equity	35.00%
Debt	65.00%

Equity Capitalization Rate ^[2]

NOI After-tax	4.90%
GCF	30.90%

Debt Capitalization Rate ^[3]

Calculated Current Yield	6.40%
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NOI After-tax Direct Capitalization Rate

Source of Capital	Capital Structure	Capitalization Rate	Marginal Tax Rate	After-tax Capitalization Rate	Weighted Capitalization Rate
Equity	35.00%	4.90%		4.90%	1.72%
Debt	65.00%	6.40%	24.00%	4.86%	3.16%
Total	100.00%				4.88%
Total (Rounded)					4.90%

GCF Direct Capitalization Rate

Source of Capital	Capital Structure	Capitalization Rate	Marginal Tax Rate	After-tax Capitalization Rate	Weighted Capitalization Rate
Equity	35.00%	30.90%		30.90%	10.82%
Debt	65.00%	6.40%	24.00%	4.86%	3.16%
WACC	100.00%				13.98%
Total (Rounded)					14.00%

Notes:

[1] From worksheet: Capital Structure

[2] From worksheet: Direct Equity Summary

[3] From worksheet: Calculated Current Yield

MONTANA DEPARTMENT OF REVENUE

Selection of Guideline Companies

Industry: Telecommunications

2020 Assessment Year

Screening Requirements:

The universe of companies is all companies listed in Value Line under the Cable TV, Telecom Services, and Telecom Utilities industries with a market capitalization under \$100B (excludes CHTR, CMCSA, T, VZ).

Companies were then selected using the following screening criteria:

1. Provides 2 way communication (wireline, wireless, VOIP, internet, TV, cable)
2. Headquartered and primarily operated in the United States.
3. Actively traded on an American exchange.
4. Not engaged in material M&A activity.

Ticker Symbol	Provides Two Way Communication	Headquartered /Incorporated in the U.S.	Actively traded on American exchange	Consider as Potential Guideline Company	Not Engaged in Material M&A Activity	Use as Guideline Company	Note
AEY	No	No	NASDAQ	No		No	
ALSK	Yes	Yes	NASDAQ	Yes	No	No	[1]
ALYE	No	N/A	OTC	No		No	
AMX	Yes	No	NYSE	No		No	
ATNI	Yes	No	NASDAQ	No		No	
ATUS	Yes	Yes	NASDAQ	Yes	Yes	Yes	
BAND	Yes	Yes	NASDAQ	No		No	
BCE	Yes	No	NASDAQ	No		No	
BCOM	Yes	No	NASdaqGS	No		No	
BZTG	Yes	Yes	OTC	No		No	
CABO	Yes	Yes	NASDAQ	Yes	Yes	No	[2]
CBB	Yes	Yes	NYSE	Yes	Yes	Yes	
CCA.TO	Yes	No	TO	No		No	
CEL	Yes	No	NYSE	No		No	
CGO.TO	No	No	TO	No		No	
CHL	Yes	No	NYSE	No		No	
CHTR	Yes	Yes	NASDAQ	Yes	No	No	
CNSL	Yes	Yes	NASDAQ	Yes	No	Yes	
CTL	Yes	Yes	NYSE	Yes	No	Yes	
CVST	Yes	Yes	OTC	No		No	
CWTC	Yes	Yes	OTC	No		No	
DISH	Yes	Yes	NASDAQ	Yes	Yes	No	[3]
DTEGY	Yes	No	NASDAQ	No		No	
DTGI	Yes	N/A	OTC	No		No	
DY	Yes	Yes	NYSE	No		No	
ERFB	Yes	Yes	OTC	No		No	

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FSNNQ	NA	N/A	OTC	No		No	
FTNW	NA	N/A	OTC	No		No	
FTR	Yes	Yes	NASDAQ	Yes	No	No	[4]
GBR	Yes	Yes	NYSE	No		No	
GOGO	Yes	Yes	NASDAQ	Yes	No	No	[5]
GSAT	Yes	No	NYSE	No		No	
HGBL	No	Yes	OTC	No		No	
HLTOY	Yes	No	OTC	No		No	
HMTV		No	NASDAQ	No		No	
I	Yes	No	NYSE	No		No	
IDT	Yes	Yes	NYSE	No		No	
IJIY	Yes	No	OTC	No		No	
IRDM	Yes	No	NASDAQ	No		No	
JCOM	Yes	Yes	NASDAQ	No		No	
KT	Yes	No	NYSE	No		No	
LBTYA	Yes	No	NASDAQ	No		No	
LILA	Yes	No	NASDAQ	No		No	
MMND	No	Yes	OTC	No		No	
NUVR	Yes	Yes	OTC	No		No	
OIBRQ	Yes	No	OTC	No		No	
OOMA	Yes	Yes	NYSE	No		No	
OTEL	Yes	Yes	NASDAQCM	No		No	
RNET	Yes	Yes	NASDAQ	No		No	
S	Yes	Yes	NYSE	Yes	Yes	No	[6]
SATS	Yes	Yes	NASDAQ	Yes	No	No	[7]
SHEN	Yes	Yes	NASDAQ	Yes	No	Yes	
SJRB.TO	Yes	No	TO	No		No	
SPKKY	Yes	No	OTC	No		No	
T.TO	Yes	No	TO	No		No	
TDS	Yes	Yes	NYSE	Yes	No	Yes	
TEF	Yes	No	NYSE	No		No	

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Selection of Guideline Companies

Industry: Telecommunications

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TIGO	Yes	No	NASDAQ	No		No	
TKOI	No	Yes	OTC	No		No	
TMUS	Yes	Yes	NASDAQ	Yes	Yes	No	[8]
TTLO	NA	N/A	OTC	No		No	
TWER	Yes	Yes	OTC	No		No	
USM	Yes	Yes	NYSE	No	No	No	
VG	Yes	No	NASDAQ	No		No	
VOD	Yes	No	NASDAQ	No		No	
WINMQ	Yes	N/A	OTC	No		No	
WOW	Yes	Yes	NASDAQ	Yes	No	Yes	
WQNI	Yes	Yes	OTC	No		No	
ZM	Yes	No	NASDAQ	No	No	No	

Notes

[1] Lacking Data

[2] acquired Clearwave Nov 2018, Acquiring Fidelity

[3] Satellite, Buying Boost Mobile

[4] impending bankruptcy

[5] deficit, unranked

[6] M&A

[7] Satellite, Broadband

[8] M&A

MONTANA DEPARTMENT OF REVENUE

Support for Capital Structure
Industry: Telecommunications
2020 Assessment Year

(\$ and Shares Outstanding In Millions, Except Per Share Amounts)

A	B	C	D	E	F	G	H	I	J	K	L	M	N
Ticker	Company	Industry Group	Financial Strength	Shares Outstanding	End of Year Closing Stock Price	MV Common Stock	MV Preferred Stock	MV Long Term Debt	PV of Operating Leases	Total Common, Preferred, LT Debt, & Op Leases	% Common	% Preferred	% Debt & Op Leases
		Value Line	Value Line	10-K	Yahoo	ExF	10-K	10-K	10-K	G+H+I+J	G/K	H/K	(I+J)/K
							Note [1]	[Note 2]					
ATUS	Altice USA	CABLETV	B	633	27.34	17,306	0	25,893	308	43,507	40%	0%	60%
CBB	Cincinnati Bell	TELUTIL	C+	50	10.47	528	129	1,977	43	2,677	20%	5%	75%
CNSL	Consol. Communic.	TELUTIL	C+	72	3.88	279	0	2,125	26	2,431	11%	0%	89%
CTL	CenturyLink Inc.	TELUTIL	B	1,090	13.21	14,393	0	35,737	1,758	51,888	28%	0%	72%
SHEN	Shenandoah Telecom.	TELESERV	B	50	41.61	2,065	0	720	367	3,152	66%	0%	34%
TDS	Telephone & Data	TELESERV	B	115	25.43	2,919	0	2,474	1,061	6,454	45%	0%	55%
WOW	WideOpenWest Inc.	CABLETV	C++	84	7.42	624	0	2,220	23	2,867	22%	0%	78%
All Companies						38,114	129	71,147	3,586	112,976	34%	0%	66%
Average											33%	1%	66%
Median											28%	0%	72%
Trimmed Average											31%	0%	68%
High											66%	5%	89%
Low											11%	0%	34%
Selected											35%		65%

Notes:

[1] Market value of preferred stock assumed to equal book value

[2] Market value of debt is fair value of long term debt from 10-K notes

YE 2019 Median	28%	0%	72%
YE 2018 Median	31%	0%	69%
YE 2017 Median			
3YR AVG			

Rationale for Changes to Guideline Companies

2020 Changes to Guideline Companies

Removed CHTR due to size and comments made by industry

Removed FTR no longer in the universe of potential guideline companies

Removed S for merger activity

Removed TMUS for merger activity

Added ATUS, WOW

MONTANA DEPARTMENT OF REVENUE

Capital Asset Pricing Model (CAPM)**Industry: Telecommunications****2020 Assessment Year**

$$k_e = R_f + \beta \times ERP$$

		<i>Ex Post</i>	<i>Ex Ante</i>
k_e =	Cost of Equity	11.55%	9.01%
R_f =	Risk Free Rate	2.25%	2.25%
β =	Beta	1.30	1.30
ERP =	Equity Risk Premium ($R_m - R_f$)	7.15%	5.20%
R_m =	Market Rate of Return	9.40%	7.45%

Risk Free Rate Measures (R_f):

The Value Line Investment Survey: Selection & Opinion^[1]

January 3, 2020 Page 1325

Selected Yields on Taxable U.S. Treasury Securities as of 12/24/19

10-year	1.90%
30-year	2.33%

Federal Reserve Statistical Release^[2] and U.S. Department of the Treasury, Daily Treasury Yield Curve Rates^[3]

U.S. government securities, Treasury constant maturities, Nominal, December 31, 2019

10-year	1.92%
20-year	2.25%
30-year	2.39%

Risk Free Rate Selected	2.25%
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Notes

[1] "Value Line Selection & Opinion", Value Line (January 3, 2020)

[2] <https://www.federalreserve.gov/datadownload/Choose.aspx?rel=H.15>[3] <https://www.treasury.gov/resource-center/data-chart-center/interest-rates/>

MONTANA DEPARTMENT OF REVENUE

Capital Asset Pricing Model (CAPM)

Industry: Telecommunications

2020 Assessment Year

$$k_e = R_f + \beta \times ERP$$

Ex Post - Equity Risk Premium Measures (ERP = Rm - Rf)

Duff & Phelps, 2020 Cost of Capital Navigator

		<u>R_m^[4]</u>	<u>R_m</u>	<u>R_f</u>	<u>ERP</u>
ERP "Historical" - <i>Ex Post</i>	<i>Arithmetic Avg.</i>	9.40%	9.40%	2.25%	7.15%
ERP "Supply-side" - <i>Ex Post</i>	<i>Arithmetic Avg.</i>	8.42%	8.42%	2.25%	6.17%
Ex Post Equity Risk Premium Selected		9.40%		2.25%	7.15%

Ex Ante - Equity Risk Premium Measures (ERP = Rm - Rf)

DOR 3 Stage Dividend Growth Model, S & P 500, See Exhibit

	<u>R_m^[4]</u>	<u>R_m</u>	<u>R_f</u>	<u>ERP</u>
ERP - <i>Ex Ante</i>	7.35%	7.35%	2.25%	5.10%

Duff & Phelps, 2020 Cost of Capital Navigator

	<u>R_m^[4]</u>	<u>R_m</u>	<u>R_f</u>	<u>ERP</u>
ERP "Conditional" - <i>Ex Ante</i>		8.00%	3.00%	5.00%

Damodaran Implied ERP (Jan 8, 2020)

	<u>R_m^[4]</u>	<u>R_m</u>	<u>R_f</u>	<u>ERP</u>
Implied Premium (FCFE) - <i>Ex Ante</i>	7.45%	7.12%	1.92%	5.20%
Implied Premium (FCFE with sustainable payout) - <i>Ex Ante</i>	7.31%	6.98%	1.92%	5.06%

	<u>R_m^[4]</u>	<u>R_m</u>	<u>R_f</u>	<u>ERP</u>
<u>Average</u>	7.37%	7.36%		5.09%
<u>Median</u>	7.35%	7.24%		5.08%
<u>High</u>	7.45%	8.00%		5.20%
<u>Low</u>	7.31%	6.98%		5.00%

Equity Risk Premium Selected

7.45%	2.25%	5.20%
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Notes

[4] R_m estimated using selected Risk Free Rate (R_f)

MONTANA DEPARTMENT OF REVENUE

Support for Beta Selection in CAPM

Industry: Telecommunications

2020 Assessment Year

A	B	C	D	E
Ticker	Company	Industry Group	Financial Strength	Beta
		<i>Value Line</i>	<i>Value Line</i>	<i>Value Line</i>
ATUS	Altice USA	CABLETV	B	1.25
CBB	Cincinnati Bell	TELUTIL	C+	1.75
CNSL	Consol. Communic.	TELUTIL	C+	1.15
CTL	CenturyLink Inc.	TELUTIL	B	1.10
SHEN	Shenandoah Telecom.	TELESERV	B	1.00
TDS	Telephone & Data	TELESERV	B	1.15
WOW	WideOpenWest Inc.	CABLETV	C++	1.65
Average				1.29
Median				1.15
Trimmed Average				1.26
High				1.75
Low				1.00
Selected				1.30

MONTANA DEPARTMENT OF REVENUE

**Inflation & Real Growth
Industry: Telecommunications
2020 Assessment Year**

A	B	C	D	Nominal Growth	
				E	F
Source Description	Inflation (CPI)	Real Growth (GDP)	Nominal Growth	Low	High
Livingston Survey ^[1]	2.19%	2.14%	4.33%		
Survey of Professional Forecasters ^[2]	2.23%	2.03%	4.26%		
Congressional Budget Office ^[3]	2.40%	2.20%	4.60%		
Average	2.27%	2.12%	4.40%		
Median	2.23%	2.14%	4.37%		
High	2.40%	2.20%	4.60%		
Low	2.19%	2.03%	4.22%		
Selected	2.20%	2.20%	4.40%	4.22%	4.60%

Inflationary Trend Factors						
Year	Dec. CPI-U Index	Percent Change From Previous	Dec. to Dec. Conversion Factor	Annual Avg. CPI-U Index	Percent Change From Previous	Annual Conversion Factor
	<i>Note [5]</i>	<i>Note [6]</i>	<i>Note [7]</i>	<i>Note [5]</i>	<i>Note [6]</i>	<i>Note [7]</i>
2007	210.036		1.2235	207.342		1.2330
2008	210.228	0.1%	1.2224	215.303	3.7%	1.1874
2009	215.949	2.6%	1.1900	214.537	-0.4%	1.1917
2010	219.179	1.5%	1.1724	218.056	1.6%	1.1724
2011	225.672	2.9%	1.1387	224.939	3.1%	1.1366
2012	229.601	1.7%	1.1192	229.594	2.0%	1.1135
2013	233.049	1.5%	1.1027	232.957	1.4%	1.0974
2014	234.812	0.8%	1.0944	236.736	1.6%	1.0799
2015	236.525	0.7%	1.0865	237.017	0.1%	1.0786
2016	241.432	2.0%	1.0644	240.007	1.2%	1.0652
2017	246.524	2.1%	1.0424	245.120	2.1%	1.0430
2018	251.233	1.9%	1.0229	251.107	2.4%	1.0181
2019	256.974	2.2%	1.0000	255.657	1.8%	1.0000

Notes

[1] Federal Reserve Bank of Philadelphia The Livingston Survey December 13, 2019 Table 3 Inflation Rate and Real GDP mean

<https://www.philadelphiafed.org/research-and-data/real-time-center/livingston-survey>

[2] Federal Reserve Bank of Philadelphia Survey of Professional Forecasters February 14, 2020 Table 8 and Table 9 Average over next 10-Year mean

<https://www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters/2020/survq120>

[3] Congressional Budget Office, The Budget and Economic Outlook: 2020 to 2030, Table 2-1

<https://www.cbo.gov/about/products/budget-economic-data#4>

[5] Historical Consumer Price Index for All Urban Consumers (CPI-U): U.S. city average, all items, index averages (1982-84=100, unless otherwise noted)

<https://www.bls.gov/cpi/tables/supplemental-files/historical-cpi-u-202001.pdf>

[6] (Row year - Previous Year) / Row Year

[7] Most current year / Row year

MONTANA DEPARTMENT OF REVENUE

3 Stage Dividend Discount Model (DDM)

Industry: Telecommunications

2020 Assessment Year

$$k_e = (D_1 / P_0) + g$$

k_e = Cost of Equity

D_1 = Expected Dividend

P_0 = Current Price Per Share

g = Sustainable Long-Term Growth

A	B	C	D	E	F	G	H	I
Ticker	Company	2019 Year End Stock Price	2020 Est Div'ds Decl'd per sh	Expected Equity Payout Yield	Sustainable Long-Term Growth Rate ^[1]	Sustainable Long-Term Growth Rate ^[1]	Cost of Equity Dividend Growth	Cost of Equity Earnings Growth
		<i>Yahoo</i>	<i>Value Line</i>	<i>D/C</i>	<i>Dividends</i>	<i>Earnings</i>	<i>E+F</i>	<i>E+G</i>
		P_0	D_1	D_1/P_0	g	g	k_e	k_e
ATUS	Altice USA	27.34	0.00	0.00%	0.00%	0.00%		
CBB	Cincinnati Bell	10.47	0.00	0.00%	0.00%	0.00%		
CNSL	Consol. Communic.	3.88	0.00	0.00%	0.00%	0.00%		
CTL	CenturyLink Inc.	13.21	1.00	7.57%	1.54%	4.36%	9.11%	11.93%
SHEN	Shenandoah Telecom.	41.61	0.32	0.77%	5.15%	6.10%	5.92%	6.87%
TDS	Telephone & Data	25.43	0.68	2.67%	3.87%	5.93%	6.54%	8.61%
WOW	WideOpenWest Inc.	7.42	0.00	0.00%	0.00%	0.00%		
Average							7.19%	9.14%
Median							6.54%	8.61%
High							9.11%	11.93%
Low							5.92%	6.87%
Selected							7.20%	9.15%

Notes

[1] From worksheet: DDM Sustainable Long-Term Growth

MONTANA DEPARTMENT OF REVENUE

Support for DDM - Short Term Growth Rate Calculations

Industry: Telecommunications

2020 Assessment Year

A	B	C	D	E	F	G
Ticker	Company	End of Year Closing Stock Price	Div'ds Decl'd per sh 2020 Est	Expected Dividend Yield	Div'ds Decl'd per sh 2023-2025 Est	Short-Term Growth Rate
		<i>Yahoo</i>	<i>Value Line</i>	<i>D / C</i>	<i>Value Line</i>	<i>Note [1]</i>
ATUS	Altice USA	27.34	0.00	0.00%	0.00	0.00%
CBB	Cincinnati Bell	10.47	0.00	0.00%	0.00	0.00%
CNSL	Consol. Communic.	3.88	0.00	0.00%	0.00	0.00%
CTL	CenturyLink Inc.	13.21	1.00	7.57%	1.00	0.00%
SHEN	Shenandoah Telecom.	41.61	0.32	0.77%	0.45	8.90%
TDS	Telephone & Data	25.43	0.68	2.67%	0.76	2.82%
WOW	WideOpenWest Inc.	7.42	0.00	0.00%	0.00	0.00%

A	B	C	D	E
Ticker	Company	Earnings per share 2020 Est	Earnings per share 2023-2025 Est	Short-Term Growth Rate
		<i>Value Line</i>	<i>Value Line</i>	<i>Note [1]</i>
ATUS	Altice USA	0.75	1.75	23.59%
CBB	Cincinnati Bell	(0.60)	0.40	
CNSL	Consol. Communic.	0.05	1.20	121.34%
CTL	CenturyLink Inc.	1.35	1.60	4.34%
SHEN	Shenandoah Telecom.	1.40	2.25	12.59%
TDS	Telephone & Data	1.10	1.50	8.06%
WOW	WideOpenWest Inc.	0.55	1.00	16.12%

Notes

[1] 5 year compound annual growth rate (CAGR) - 4 periods

MONTANA DEPARTMENT OF REVENUE

Support for DDM - Sustainable Long Term Growth

Industry: Telecommunications

2020 Assessment Year

Dividend Growth Rate									Stage 1				
Ticker	Company	Year End Stock Price	Expected Short-Term Dividend Growth Rate	Expected Long-Term Growth Rate	Expected Dividend Yield	Internal Rate of Return	Implied Sustainable Long-Term Growth Rate (g)	Initial Investment	D ₁	D ₂	D ₃	D ₄	D ₅
		Yahoo	Note [1]	Note [2]	D_1/P_0	$K_e = IRR \text{ of } D_1 : D_{500}$	$g = IRR - Div. \text{ Yield}$						
ATUS	Altice USA	27.34	0.00%	4.40%	0.00%			(27.34)	0.00	0.00	0.00	0.00	0.00
CBB	Cincinnati Bell	10.47	0.00%	4.40%	0.00%			(10.47)	0.00	0.00	0.00	0.00	0.00
CNSL	Consol. Communic.	3.88	0.00%	4.40%	0.00%			(3.88)	0.00	0.00	0.00	0.00	0.00
CTL	CenturyLink Inc.	13.21	0.00%	4.40%	7.57%	9.11%	1.54%	(13.21)	1.00	1.00	1.00	1.00	1.00
SHEN	Shenandoah Telecom.	41.61	8.90%	4.40%	0.77%	5.92%	5.15%	(41.61)	0.32	0.35	0.38	0.41	0.45
TDS	Telephone & Data	25.43	2.82%	4.40%	2.67%	6.54%	3.87%	(25.43)	0.68	0.70	0.72	0.74	0.76
WOW	WideOpenWest Inc.	7.42	0.00%	4.40%	0.00%			(7.42)	0.00	0.00	0.00	0.00	0.00

Earnings Growth Rate									Stage 1				
Ticker	Company	Year End Stock Price	Expected Short-Term Earnings Growth Rate	Expected Long-Term Growth Rate	Expected Dividend Yield	Internal Rate of Return	Implied Sustainable Long-Term Growth Rate (g)	Initial Investment	D ₁	D ₂	D ₃	D ₄	D ₅
		Yahoo	Note [1]	Note [2]	D_1/P_0	$K_e = IRR \text{ of } D_1 : D_{500}$	$g = IRR - Div. \text{ Yield}$						
ATUS	Altice USA	27.34	23.59%	4.40%	0.00%			(27.34)	0.00	0.00	0.00	0.00	0.00
CBB	Cincinnati Bell	10.47	0.00%	4.40%	0.00%			(10.47)	0.00	0.00	0.00	0.00	0.00
CNSL	Consol. Communic.	3.88	121.34%	4.40%	0.00%			(3.88)	0.00	0.00	0.00	0.00	0.00
CTL	CenturyLink Inc.	13.21	4.34%	4.40%	7.57%	11.93%	4.36%	(13.21)	1.00	1.04	1.09	1.14	1.19
SHEN	Shenandoah Telecom.	41.61	12.59%	4.40%	0.77%	6.87%	6.10%	(41.61)	0.32	0.36	0.41	0.46	0.51
TDS	Telephone & Data	25.43	8.06%	4.40%	2.67%	8.61%	5.93%	(25.43)	0.68	0.73	0.79	0.86	0.93
WOW	WideOpenWest Inc.	7.42	16.12%	4.40%	0.00%			(7.42)	0.00	0.00	0.00	0.00	0.00

Notes

[1] From worksheet: DDM Short Term Growth Rate Calculations

[2] From worksheet: Inflation & Real Growth

MONTANA DEPARTMENT OF REVENUE

Support for DDM - Sustainable Long Term Growth

Industry: Telecommunications

2020 Assessment Year

Dividend	Stage 2															Stage 3		
Ticker	D ₆	D ₇	D ₈	D ₉	D ₁₀	D ₁₁	D ₁₂	D ₁₃	D ₁₄	D ₁₅	D ₁₆	D ₁₇	D ₁₈	D ₁₉	D ₂₀	D ₂₁	D ₂₂	D ₅₀₀
ATUS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
CBB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
CNSL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
CTL	1.00	1.01	1.01	1.01	1.01	1.02	1.02	1.02	1.03	1.03	1.03	1.04	1.04	1.04	1.04	1.09	1.14	989,282,542
SHEN	0.49	0.53	0.58	0.63	0.68	0.74	0.80	0.87	0.95	1.03	1.11	1.21	1.31	1.43	1.55	1.62	1.69	1,468,004,330
TDS	0.78	0.81	0.83	0.85	0.88	0.90	0.93	0.96	0.99	1.01	1.04	1.07	1.11	1.14	1.17	1.22	1.28	1,108,835,675
WOW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0

Earnings	Stage 2															Stage 3		
Ticker	D ₆	D ₇	D ₈	D ₉	D ₁₀	D ₁₁	D ₁₂	D ₁₃	D ₁₄	D ₁₅	D ₁₆	D ₁₇	D ₁₈	D ₁₉	D ₂₀	D ₂₁	D ₂₂	D ₅₀₀
ATUS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
CBB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
CNSL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
CTL	1.24	1.29	1.35	1.40	1.47	1.53	1.60	1.67	1.74	1.81	1.89	1.97	2.06	2.15	2.24	2.34	2.44	2,123,136,377
SHEN	0.58	0.65	0.72	0.81	0.91	1.02	1.14	1.28	1.43	1.60	1.80	2.01	2.26	2.53	2.83	2.96	3.09	2,682,051,148
TDS	1.00	1.08	1.16	1.25	1.35	1.46	1.57	1.69	1.83	1.97	2.12	2.29	2.47	2.66	2.87	2.99	3.13	2,715,381,829
WOW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0

MONTANA DEPARTMENT OF REVENUE

Support for Yield Capitalization Rate - Debt Rating

Industry: Telecommunications

2020 Assessment Year

A	B	C	D	E	F
Ticker	Company	Industry Group	Financial Strength	Moody's Long Term Rating	Numeric Rating
		<i>Value Line</i>	<i>Value Line</i>	<i>Moodys.com</i>	
ATUS	Altice USA	CABLETV	B		14
CBB	Cincinnati Bell	TELUTIL	C+	B2	15
CNSL	Consol. Communic.	TELUTIL	C+		18
CTL	CenturyLink Inc.	TELUTIL	B	Ba3	13
SHEN	Shenandoah Telecom.	TELESERV	B		11
TDS	Telephone & Data	TELESERV	B	Ba1	11
WOW	WideOpenWest Inc.	CABLETV	C++		14
Average					14
Median					14
Trimmed Average					13
High					18
Low					11
Selected				B1	14

MONTANA DEPARTMENT OF REVENUE

Support for Direct Capitalization - Equity Capitalization Rates

Industry: Telecommunications

2020 Assessment Year

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	
		End of Year Closing Stock Price	VL Historic EPS	VL Est EPS	VL Historic P/E Ratio	VL Est P/E Ratio	Ke Estimate - Earnings (Hist. P/E)	Ke Estimate - Earnings (Est. P/E)	VL Historic Cash Flow Per Share	VL Est Cash Flow Per Share	VL Historic P/CF Ratio	VL Est P/CF Ratio	Ke Estimate - Cash Flow (Hist. P/CF)	Ke Estimate - Cash Flow (Est. P/CF)	Market Value of Equity	Book Value of Equity		
Ticker	Company	Yahoo	Value Line	Value Line	P/E Ratio	C/D	C/E	1/F	1/G	Value Line	Value Line	C/J	C/K	1/L	1/M	Price x Shrs	10-K	MTBR
ATUS	Altice USA	27.34	0.21	0.75	130.19	36.45	0.77%	2.74%	3.39	4.55	8.06	6.01	12.40%	16.64%	17,306	2,270	7.62	
CBB	Cincinnati Bell	10.47	(1.14)	(0.60)	(9.18)	(17.45)			4.71	5.50	2.22	1.90	44.99%	52.53%	528	54	9.70	
CNSL	Consol. Communic.	3.88	(0.29)	0.05	(13.38)	77.60		1.29%	5.01	5.35	0.77	0.73			279	410	0.68	
CTL	CenturyLink Inc.	13.21	1.32	1.35	10.01	9.79	9.99%	10.22%	5.71	5.80	2.31	2.28	43.22%	43.91%	14,393	19,828	0.73	
SHEN	Shenandoah Telecom.	41.61	1.10	1.40	37.83	29.72	2.64%	3.36%	4.32	4.60	9.63	9.05	10.38%	11.06%	2,065	442	4.67	
TDS	Telephone & Data	25.43	1.03	1.10	24.69	23.12	4.05%	4.33%	8.93	8.75	2.85	2.91	35.12%	34.41%	2,919	2,863	1.02	
WOW	WideOpenWest Inc.	7.42	0.50	0.55	14.84	13.49	6.74%	7.41%	1.16	3.15	6.40	2.36	15.63%	42.45%	624			
Average					27.86	24.67	4.84%	4.89%						26.96%	33.50%			
Median					14.84	23.12	4.05%	3.85%						25.37%	38.43%			
Trimmed Average					15.64	22.51	4.48%	4.46%						26.59%	34.35%			
High					130.19	77.60	9.99%	10.22%						44.99%	52.53%	9.70		
Low					(13.38)	(17.45)	0.77%	1.29%						10.38%	11.06%	0.68		
Selected							4.90%							30.90%				4.00

MONTANA DEPARTMENT OF REVENUE

Support for Direct Capitalization - Debt Capitalization Rate

Industry: Telecommunications

2020 Assessment Year

(\$ in Millions)

A	B	C	D	E	F	G	H	I	J
Ticker	Company	YE 2019 Interest Exp.	YE 2018 MV LT Debt	YE 2018 BV LT Debt	YE 2019 MV LT Debt	YE 2019 BV LT Debt	2019 Avg MV LT Debt	2019 Current Yield	MTBR
		10-K	10-K	10-K	10-K	10-K	(D+F)/2	(C/H)	(F/G)
ATUS	Altice USA	1,537	23,236	22,813	25,893	24,420	24,564	6.26%	1.06
CBB	Cincinnati Bell	140	1,717	1,930	1,977	1,924	1,847	7.56%	1.03
CNSL	Consol. Communic.	137	2,155	2,334	2,125	2,278	2,140	6.39%	0.93
CTL	CenturyLink Inc.	2,021	32,915	36,061	35,737	32,417	34,326	5.89%	1.10
SHEN	Shenandoah Telecom.	29	770	770	720	720	745	3.95%	1.00
TDS	Telephone & Data	165	2,309	2,439	2,474	2,326	2,392	6.90%	1.06
WOW	WideOpenWest Inc.	142	2,094	2,296	2,220	2,290	2,157	6.59%	0.97
All Companies		4,170			71,147	66,375	68,171	6.12%	1.07
Average								6.22%	1.02
Median								6.39%	1.03
Trimmed Average								6.40%	1.02
High								7.56%	1.10
Low								3.95%	0.93
Selected								6.40%	1.02

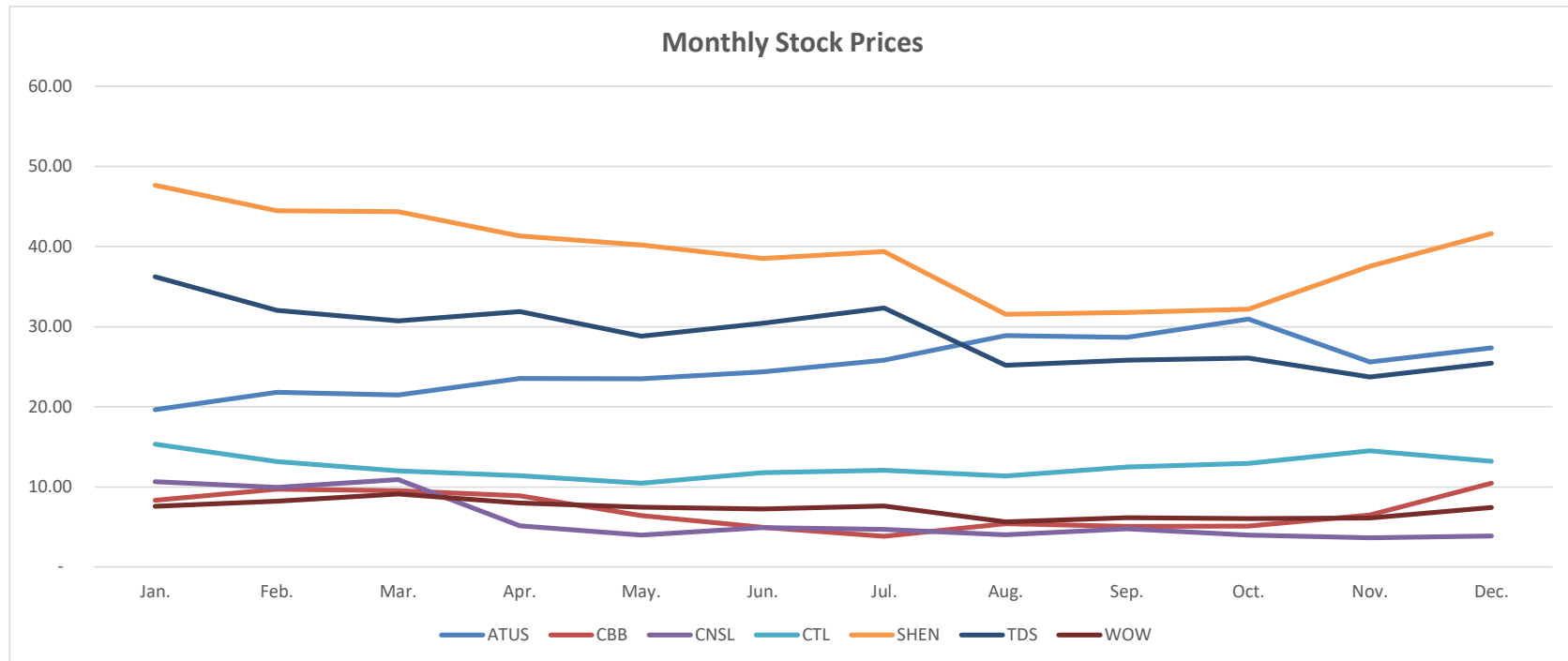
MONTANA DEPARTMENT OF REVENUE

Support of Stock Price - From YAHOO Finance

Industry: Telecommunications

2020 Assessment Year

		End of Period Closing Stock Price											
1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	B	C	D	E	F	G	H	I	J	K	L	M	N
Ticker	Company	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
ATUS	Altice USA	19.64	21.81	21.48	23.56	23.49	24.35	25.81	28.88	28.68	30.95	25.58	27.34
CBB	Cincinnati Bell	8.34	9.70	9.54	8.90	6.40	4.95	3.82	5.43	5.07	5.11	6.49	10.47
CNSL	Consol. Communic.	10.68	9.93	10.91	5.16	4.00	4.93	4.71	4.03	4.76	4.00	3.63	3.88
CTL	CenturyLink Inc.	15.32	13.19	11.99	11.42	10.45	11.76	12.09	11.38	12.48	12.94	14.49	13.21
SHEN	Shenandoah Telecom.	47.63	44.44	44.36	41.33	40.21	38.52	39.36	31.54	31.77	32.16	37.55	41.61
TDS	Telephone & Data	36.22	32.05	30.73	31.88	28.81	30.40	32.34	25.20	25.80	26.09	23.71	25.43
WOW	WideOpenWest Inc.	7.56	8.22	9.10	7.99	7.46	7.26	7.59	5.62	6.16	6.04	6.13	7.42



MONTANA DEPARTMENT OF REVENUE

Capital Expenditures Estimate Based on Guideline Companies

Industry: Telecommunications

2020 Assessment Year

(\$ In Millions)

1	2		3	4	5	6	7	8	9	10	11
A	B	C	D	E	F	G	H	I	J	K	L
Ticker	Company	Inflation	PP&E, Gross	PP&E, Gross	Average PP&E	Depreciation Expense	Average Life of Assets			Replacement Cost (RC)	RC as % of Depreciation
			Current Year	Previous Year				Note [1]	Note [1]	Note [1]	
		MTDOR (CPI)	10-K, Notes	10-K, Notes	(D+E)/2	10-K (CF)	F/G	C*H	1/(1+C)^H	G*I/(1-J)	K/G
ATUS	Altice USA	2.20%	11,030	9,874	10,452	2,263	5	0.10	0.90	2,405	106.26%
CBB	Cincinnati Bell	2.20%	4,745	4,599	4,672	305	15	0.34	0.72	362	118.89%
CNSL	Consol. Communic.	2.20%	4,064	3,881	3,973	381	10	0.23	0.80	431	112.99%
CTL	CenturyLink Inc.	2.20%	55,425	53,267	54,346	4,829	11	0.25	0.78	5,504	113.98%
SHEN	Shenandoah Telecom.	2.20%	1,499	1,403	1,451	140	10	0.23	0.80	158	112.96%
TDS	Telephone & Data	2.20%	12,864	12,074	12,469	932	13	0.29	0.75	1,086	116.53%
WOW	WideOpenWest Inc.	2.20%	3,014	2,809	2,911	206	14	0.31	0.74	242	117.42%
Average											114.15%
Median											113.98%
Trimmed Average											114.78%
High											118.89%
Low											106.26%
Selected											114.00%

Notes

[1] Cornell, B. & Gerger, R. (2017). Estimating Terminal Values with Inflation: The Inputs Matter-It Is Not a Formulaic Exercise. *Business Valuation Review*, Volume 36, Number 4, 117-123.